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NOTES ON AUSTRALIAN AMPHIBIANS

BY

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The following paper is based upon three separate collections made during the years 1929-1930 (starting on August 1); 1936-1937 (starting on October 3); and 1947-1948 (starting on September 10).

Practically the full six months allowed on a visitor's visa was spent in the field on each trip. This was made possible through the courtesy of the director of the Australian Museum, Dr. Charles Anderson; Dr. A. B. Walkom who succeeded him; and Mr. J. R. Kinghorn, assistant to the director and curator of birds, reptiles, and amphibians, who attended to the various formalities before I arrived in Australia, thus saving much valuable time.

To mention all those whose hospitality and help I enjoyed at the various cattle and sheep stations, on which most of the collecting was done, would be next to impossible. I cannot, however, omit those who "opened the door" to Australia by starting me on my way: Mr. James Burns, of Sydney; Mr. William Kelly, of Brisbane; and Mr. Charles Craig, of Perth, who attended to all my wants in West Australia. To these gentlemen I am deeply indebted for arranging my stops on the various stations whose owners or managers did everything possible to make my efforts a success. Mr. and Mrs. Percy Allan, of the Retro Station, and Mr. and Mrs. Charles Barnard, owners of Coomooboolaroo, cannot be left unmentioned.

Weather conditions were ideal on all three trips. On the third I was fortunate enough to encounter a few light rains which brought out a variety of amphibians not met with before. World War II, however, still had a lingering and disastrous effect on travel conditions and these greatly hin-

dered field activities so that it was impossible to control one's movements or take along all of the necessary collecting equipment. For this reason much valuable time was lost in West Australia at the conclusion of the third expedition.

During the study of the material collected it was found that there were three amphibians which appeared to be new. In order not to run the risk of adding to synonymy these were sent to Mr. Arthur Loveridge to compare with specimens in the almost complete collection of Australian amphibians in the Museum of Comparative Zoology at Harvard. Mr. Loveridge very kindly set aside his own work and spent considerable time studying this material and agreed with me that they were new species. These were originally described in the Proceedings of the Biological Society of Washington, vol. 63, pp. 131-138, December 29, 1950.

LOCALITIES VISITED

QUEENSLAND

Callandoon: September 23, 1947–October 3, 1947. A sheep station in the vicinity west of Goondiwindi, southeastern Queensland. This is a thinly wooded area and contains grasslands with scattered ring-barked gum trees of several species and patches of brigalow scrub.

Clermont: August 14, 1929. A town in eastern Queensland at the terminus of the Emerald-to-Clermont railway. It is typical sheep country with open grasslands and scattered gum trees.

Coomooboolaroo: September 15–October 26, 1929, and October 10–November 15, 1936. A cattle station fifteen miles south of Duarina, east central Queensland. This area is heavily wooded with iron bark trees and much ring-barked country. Several lagoons are on the station but there is no running water, although there are a few stream beds which may have some at long intervals. Many fallen and many dead but standing trees are present. This was one of the best collecting grounds encountered.

Duarina: November 13, 1936. A village on the Rockhampton-to-Emerald railway fifty-five miles west of Rockhampton.

Gaeta: December 29, 1936, and January 11, 1937. A cattle station ten miles west of Kolonga Creek Station. It consists of heavily wooded and a considerable number of rocky areas. Kolonga Creek runs through this station.

Goondiwindi: September 28, 1947. A town on the Brisbane-to-Dirranbandi railway 140 miles west of Brisbane.

Kolonga Creek: December 24-29, 1936, and January 1-13, 1937. A cattle station twenty-five miles north of GinGin. This area consists of open rolling grasslands with many large gum trees, many of them ring-barked. A moderate-sized and permanent stream (Kolonga Creek), with some deep pools along the banks, runs through the property.

Margenta: November 29, 1936. A sheep station in the vicinity east of Retro and similar in character to it (see below).

McPherson Range: October 3-7, 1936. A wooded mountain range (altitude 2,500 feet) with clearings on the ridges. Some lumbering has been done and there are roads through the virgin forest. On the clear ridges are many fallen trees and burned out logs and stumps of the large gums. This range is located fifty miles inland on the New South Wales-Queensland border.

Noondoo: September 10-20, 1947. A sheep station south of the Noondoo siding ten miles east of Dirranbandi, southeastern Queensland. There are scattered small trees and much open country with artesian-well water. A peculiar formation not seen elsewhere was a number of sand bars paralleling each other across some of the open grasslands.

Retro: August 1-September 10, 1929, and November 30-December 12, 1936. A sheep station twenty miles west of Capella, eastern Queensland. Here are open grasslands and scattered gum trees with moderately heavy groves of the tea tree and an occasional bottle tree. Both black and red soil are in evidence. Though the surrounding country did not look attractive as a collecting ground it proved to be excellent, with a large number of species.

Talafa: November 17-28, 1936. A sheep station twenty miles south of Emerald. It is partly wooded with a heavy growth of brigalow scrub but includes much open grassland. Bottle trees are much in evidence on this station.

NEW SOUTH WALES

Blue Mountains: Localities visited in this region were Cox's River, February 15, 1930; Hampton, February 14, 1930; and the Hampton-Lithgow area, January 19-23, 1948.

Bundy: October 23–November 15, 1947. A sheep station twenty miles southeast of Moree, northeastern New South Wales. This is open grassland with considerable brigalow scrub. A small creek, dried up in the summer months, runs through the property. A small amount of fallen timber and ring-barked trees characterizes this area.

Carroll: November 2, 1947. A sheep station ten miles west of Moree. This consists of the same type of country as that around Bundy Station. It also has a creek which is dried up in the summer months.

Keera: October 14–20, 1947. A cattle and sheep station fifteen miles southeast of Bingara, northeastern New South Wales. This is a wooded, hilly country with the Gwydir River, a fast-flowing stream, running through the property and giving an abundant and permanent supply of water. This region also includes a considerable area of open grasslands with scattered trees.

Sydney: November 7, 1929, February 9, 1930, February 19, 1948. The metropolis of New South Wales.

Ulong: January 27–February 15, 1948. A lumber mill town twenty-eight miles inland from Coff's Harbor, northeastern New South Wales. This is hilly open country with scattered trees and includes several streams of water and an area of virgin forest in which lumbering operations are much in evidence. Numerous log-roads allow access to the untouched areas.

VICTORIA

Ned's Corner: November 20–December 6, 1929. A sheep station on the banks of the Murray River, thirty-seven miles west of Mildura. It is characterized by open grassland and red soil. There is, on the banks of the river, a heavy growth of large gum trees.

WEST AUSTRALIA

Geraldton: January 5, 1948. A town on the coast of West Australia. It is situated between 28 and 29 degrees south latitude.

Nangabrook: January 8–22, 1930. A lumber mill in the heart of the giant gum forests, eighteen miles east of Yarloop on the main southwestern line from Perth to Pemberton. It consists of a virgin forest of giant gum trees with a heavy growth of ferns and grass trees, or "black boys" as they are sometimes called.

PELSART ISLAND

This island, visited December 1-30, 1947, is a coral reef belonging to the southern group of the Abrolhos Islands, forty miles west of Geraldton. Latitude 29° south, longitude 114° east. It is approximately six miles long and three-quarters of a mile wide at the widest part, and is composed of large flakes and small pieces of broken coral, covered in places with low scrub vegetation and a few mangroves in a lagoon in the reef.

SYSTEMATIC LIST OF SPECIES

LEPTODACTYLIDAE

Mixophyes fasciolatus fasciolatus Günther

This name is applied to five specimens, 2 (C.A.S. Nos. 77824-77825) from Cox's River in the Blue Mountains and 3 (C.A.S. Nos. 82049-82051) from Ulong, New South Wales. Loveridge¹ has given the subspecific name *schevilli* to a form from northern Queensland having only two phalanges of the fourth toe free of web, instead of three as in typical *M. f. fasciolatus*. Two specimens from Ulong tend to show this character, but a third (juvenile) has three phalanges of the fourth toe entirely free of web.

In the adpressed limb the tibio-tarsal joint reaches the snout; vomerine teeth in two prominent straight series between the choanae; tongue nitched behind; a large oval tympanum; subarticular tubercles prominent; a large inner metacarpal tubercle and a prominent inner metatarsal tubercle; a prominent crescent-shaped fold of skin over the tympanum.

The color, in life, is grayish or brownish, with irregular patches of a darker shade; limbs of adults with broad crossbars, obsolete in some individuals. The juvenile from Ulong shows distinct narrow bars of black. A characteristic heavy dark-brown bar between the eyes is absent in No. 82050 from Ulong. The thighs are marbled with black and the groin is whitish with black spots. Under surfaces are whitish.

The largest specimen is in the Ulong series, a female (82050) 92 mm. in length. It was dug out of a rotten stump on a grassy hillside.

Cyclorana alboguttatus (Günther)

(Figure 1)

Six specimens (C.A.S. Nos. 77973-77977) from Coomooboolaroo and 1 (C.A.S. No. 77978) from Kolonga Creek.

1. Occasional Papers of the Boston Society of Natural History, 8, p. 55, 1933.

Three individuals show the vomerine teeth in two straight series between the choanae. In one the series touch on the median line and one (No. 77977) has a very prominent single series. Tongue slightly nicked behind; tympanum prominent; two moderate-sized metacarpal tubercles; a large elongate metatarsal tubercle; subarticular tubercles prominent; toes about one-third webbed; in adpressed limb tibio-tarsal joint reaches eye, or slightly beyond.

Skin smooth, with scattered flattened tubercles; a prominent crescent-like fold over tympanum; lateral folds prominent; belly and back of thighs granular; throat smooth.

Color, in life, dark slate to ashy gray; back of thighs covered with small round spots of white; sides mottled with black; belly whitish; a more or less obscure dorsal stripe; throat mottled or clouded with dark gray.

The Kolonga specimen was taken in a puddle under a cattle guard, those from Coomooboolaroo from crevices between the rocks lining a well.

A specimen from Coomooboolaroo measures 60 mm. from snout to vent.

Cyclorana australis (Gray)

Nine specimens (C.A.S. Nos. 77828-77836), the largest species of the genus encountered, were taken at Coomooboolaroo in October and November, 1936, and a tenth one from Kolonga Creek, January 1, 1937.

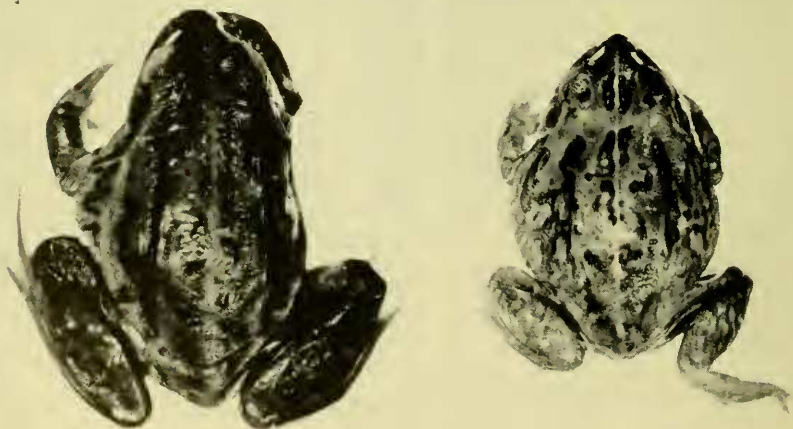


Fig. 1 (left). *Cyclorana alboguttatus* C.A.S. No. 77977, Coomooboolaroo Cattle Station, 15 miles south of Duarina, Queensland. Natural size.

Fig. 2 (right). *Cyclorana brevipes* C.A.S. No. 77827, Coomooboolaroo Cattle Station, 15 miles south of Duarina, Queensland. Natural size.

Vomerine teeth in two prominent series between the choanae; tongue slightly nicked behind; tympanum distinct, but moderate in size; two large metacarpal tubercles; a prominent elongate and free-edged metatarsal tubercle; subarticular tubercles prominent; in adpressed limb tibio-tarsal joint reaches midway between tympanum and eye or to the eye; toes slightly webbed.

A very prominent dorsolateral ridge is present. A distinct fold of skin passes from the front of the nostril over the eye and the tympanum to the corner of the mouth. The skin is granular in males and smooth or very slightly granular in females. The toes are slightly webbed.

In life, the dorsal surface is grayish, spotted and marbled with black. The undersurfaces are whitish, the throat being spotted with dark gray in females and uniform dark gray in males. No. 77837, a breeding male, has black inner metacarpal tubercles.

The Coomooboolaroo specimens were taken at 9:30 at night in the high grass alongside a pool of water. The Kolonga specimen was dug out of the lawn in front of the homestead.

This species is known to the pastoralists as the "Bully Frog."

A specimen from Coomooboolaroo measures 87 mm. from snout to vent.

Cyclorana brevipes (Peters)

(Figure 2)

Two specimens (C.A.S. Nos. 77826-77827) are from Coomooboolaroo. Vomerine teeth in two round clusters between choanae; tongue nicked behind; tympanum distinct; two prominent metacarpal tubercles; prominent metatarsal tubercle with free inner edge; subarticular tubercles prominent; fingers rounded; toes slightly webbed; tibio-tarsal joint in adpressed limb reaches to middle of tympanum.

Skin smooth with small, flat warts; sides and belly granular; throat smooth, except that of males which is finely granular; a crescent-like fold of skin over the tympanum.

In life, the color is gray with irregular dorsal spots and blotches. A narrow dorsal stripe is present in the two specimens at hand. Belly whitish; throat of female (No. 77827) clouded with light gray; throat of male (No. 77826) slate color with the edges somewhat darker.

The female measures 48 mm. from snout to vent.

Both specimens were taken on the banks of a lagoon under pieces of bark half buried in the mud.

Cyclorana inermis (Peters)

(Figure 3)

This was a common species at Coomooboolaroo, where 135 specimens

(C.A.S. Nos. 77838-77972) were taken. Five (C.A.S. Nos. 77915-77919) are from Kolonga Creek.

A frog of slender build with a large tympanum situated very close to the eye and about two-thirds as large. Vomerine teeth in two small clusters between fronts of choanae; tongue nicked behind; two small metatarsal tubereles; subarticular tubereles prominent; toes two-thirds webbed; in adpressed limb tibio-tarsal joint reaches snout.

The skin is rugose; belly and back of thighs covered with tubereles; throat smooth; a gular fold present.

In life, the color is gray, with blackish dorsal spots; back of thighs mottled with black; undersurfaces clear, except the throat which is dark in males. The lips are spotted with white.

The entire series were taken in the garden of the homestead, where they were found hidden at the base of the leaves of the pineapple plants. A few were found hopping about the pathways after dark.

Thirty-five mm. from snout to vent is a large individual.

***Cyclorana slevini* Loveridge**
(Figure 4)

Two specimens of this frog (C.A.S. Nos. 82052-82053) taken at Noon-doo were described by Loveridge². Its nearest relative appears to be *C.*

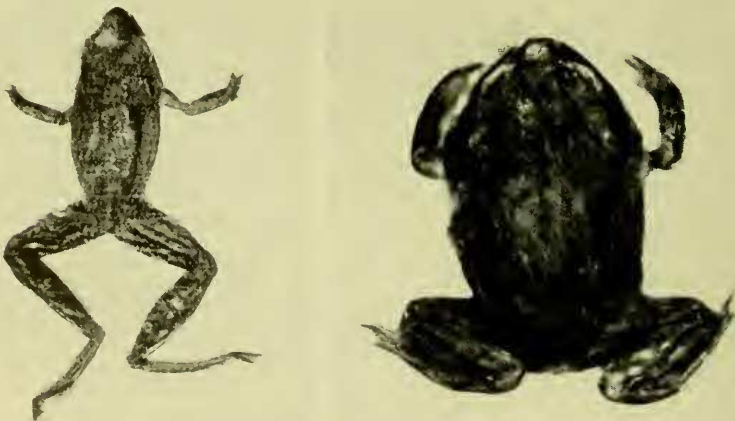


Fig. 3 (left). *Cyclorana inermis* C.A.S. No. 77920, Coomooboolaroo Cattle Station, 15 miles south of Duaringa, Queensland. Natural size.

Fig. 4 (right). *Cyclorana slevini* C.A.S. No. 82052, Noondoo, Queensland. Natural size.

2. Proceedings of the Biological Society of Washington, vol. 63, pp. 131-138, Dec. 29, 1950.

australis, from which it differs in interorbital width, size of tympanum, and webbing of toes.

Vomerine teeth in two prominent clusters between choanae; tongue rounded behind; tympanum large, about the size of orbit; an elongate inner metacarpal tubercle; an inner free-edged metatarsal tubercle; subarticular tubercles present, but not prominent; toes two-thirds webbed; in adpressed limb tibio-tarsal joint reaches tympanum; lateral folds absent; belly and anal region granular.

In life, the color is grayish, with darker spots or reticulations. The undersurfaces are yellowish-white.

Both specimens were taken half buried, in sandy soil, under old slabs of bark. The larger one, a female, is 48 mm. in length from snout to vent.

***Limnodynastes convexiusculus* (Macleay)**

A single specimen of this species (C.A.S. No. 78606) was taken at Kolonga Creek.

Vomerine teeth in a long, straight series extending well beyond the outer edge of choanae; tongue oval, tapering toward end and slightly nicked behind; tympanum very indistinct; a prominent inner and slightly smaller outer metacarpal tubercle with an elongate tubercle between; an elongate metatarsal tubercle; subarticular tubercles very prominent and conical in shape; fingers and toes long and rounded, without enlarged terminal disks; a rudimentary web between the third and fourth and the fourth and fifth toe; in the adpressed limb tibio-tarsal joint reaches back of the eye.

The skin is smooth, with the back of the thighs slightly granular.

In life, the ground color is light reddish-brown; a wide blackish band extending from the tip of the snout to the forearm. A whitish tapering stripe from the back of the eye to the forelimb, widest posteriorly; a number of large blackish spots on the sides; three wide blackish dorsal stripes with undulating edges, the center one with a very narrow longitudinal stripe of white; undersurfaces whitish, the throat and sides of belly clouded with reddish-brown.

This, a half-grown specimen, was taken under a piece of bark on the banks of Kolonga Creek.

***Limnodynastes dorsalis dumerilii* Peters**

(Figure 5)

This species was not met with in numbers, only three specimens (C.A.S. Nos. 78035 and 82196-82197) from the Hampton-Littigow area in the Blue Mountains being taken. All agree in having no dorsal stripe and with the toes devoid of fringes.

Vomerine teeth in a straight series, with a very slight division, and extend to middle of the choanae; tongue rounded behind, tympanum hidden; metacarpal tubercles prominent; a very large spade-like inner metatarsal tubercle; no outer tubercle; subarticular tubercles prominent, those at the base of toes being particularly so; toes slightly fringed and webbed; tibio-tarsal joint when carried forward reaches tympanum.

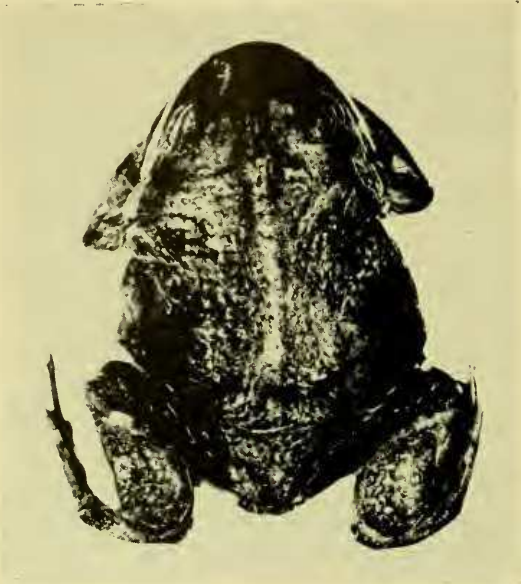


Fig. 5. *Limnodynastes dorsalis dumerilii* C.A.S. No. 78035, Hampton, New South Wales. Natural size.

The skin is smooth, covered with minute tubercles and small, flat, glands; an elongate gland extends from the back of the eye to the shoulder; a white lateral fold; a prominent round whitish gland at each side of the vent; tibia with a large, oval-shaped gland; back of thighs covered with small tubercles.

The color, in life, is dark brown with scattered dark markings; sides and belly with dark brown reticulations; throat uniformly dark brown or light brown with reticulations of a darker shade.

The largest specimen of the series measures 69 mm. in length. One (C.A.S. No. 82197) was taken towards late afternoon in a small hollow in the base of a tree.

***Limnodynastes dorsalis terraereginae* Fry**

(Figure 6)

A series of eight specimens; 3 (C.A.S. Nos. 78038-78040) from Coo-

mooboolaroo; 2 (C.A.S. Nos. 78036-78037) from Kolonga, and 3 (C.A.S. Nos. 82198-82200) from Keera have the second finger considerably flattened and heavily fringed.

The vomerine teeth extend to the outer edge of the choanae. The hind leg is slightly shorter than in its congener *L. d. dumerilii*, which it resembles in other respects, except coloration.

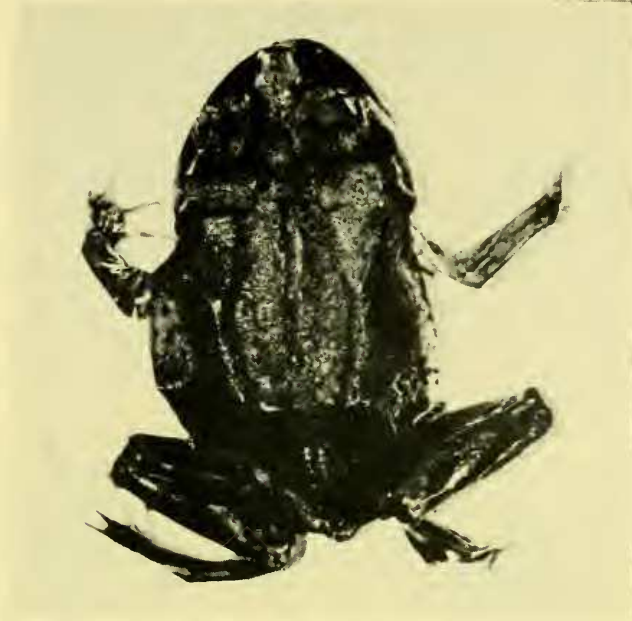


Fig. 6. *Limnodynastes dorsalis terrareginae* C.A.S. No. 78038, Coomooboolaroo Cattle Station, 15 miles south of Daringa, Queensland. Natural size.

A specimen (No. 78036) was colored in life as follows: ground color black; throat, sides and back of jaw yellow; lower lateral surfaces yellow, with black spotting and reticulations; thighs and undersurface of hind legs red; reddish areas on top of forelegs; undersurfaces yellowish, with sides and throat mottled with gray. Two specimens from Keera, two from Coomooboolaroo, and one from Kolonga show signs of a dorsal stripe.

A specimen from Coomooboolaroo is 64 mm. in length. The Kolonga specimens were taken in the water under a cattle guard and those from Keera in newly dug postholes which filled with rain during the night.

***Limnodynastes fletcheri* Boulenger**

(Figure 7)

Twenty-nine specimens (C.A.S. Nos. 82355-82381 and 82389-82390)

from Callandoon, 2 (C.A.S. Nos. 82382-82383) from Keera, and 5 (C.A.S. Nos. 82384-82388) from Bundy.

Vomerine teeth in two short series in back of choanae; tongue rounded behind; tympanum indistinct; a large inner and small outer metacarpal tubercle; a small elongate inner metatarsal tubercle; subarticular tubercles present; first finger slightly fringed, second more heavily; toes slightly webbed; in adpressed limb tibio-tarsal joint reaches tympanum.

A prominent fold of skin is present from below the back of the eye to the forearm. The top of the hind legs and the anal region are covered with small tubercles. No. 82371, a breeding male, has a swollen thumb and the bone protruding as in *L. peronii*.

Color, in life, slate-gray, with irregular spots and blotches over the sides and dorsal surface; limbs crossbarred; a black spot under the eye; usually a dorsal stripe of white and a pink spot over the eye; undersurfaces whitish; throat clouded with dark gray.

In the present series of 36 specimens 10 are without the dorsal stripe and 6 lack the pink spot over the eye.

A large male measures 54 mm. from snout to vent.

All were found under old logs or bark in moist depressions in paddocks.

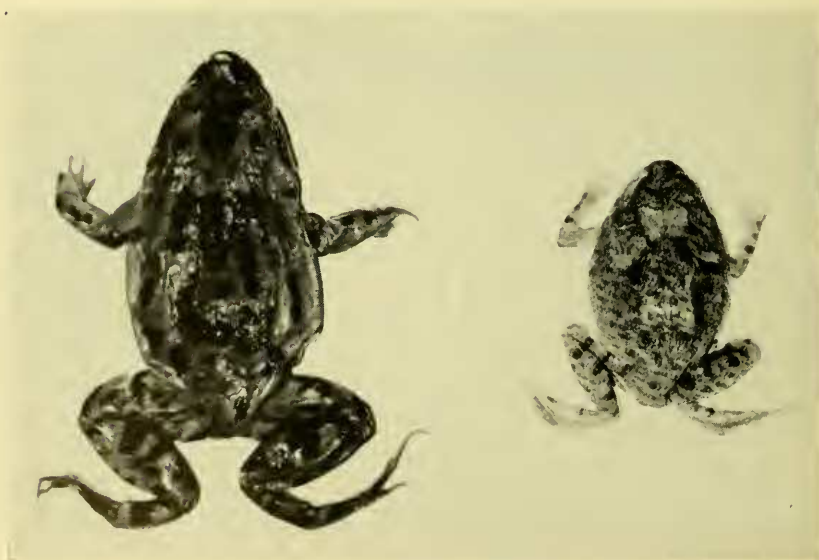


Fig. 7 (left). *Limnodynastes fletcheri* C.A.S. No. 82370, Callandoon Sheep Station, vicinity west of Goondiwindi, Queensland. Natural size.

Fig. 8 (right). *Limnodynastes ornatus* C.A.S. No. 78050, Coomooboolaroo Cattle Station, 15 miles south of Duarina, Queensland. Natural size.

Limnodynastes ornatus (Gray)

(Figure 8)

Eleven specimens were taken, 10 being from Coomooboolaroo and one from Kolonga.

Vomerine teeth in two straight, or very slightly curved, series extending beyond choanae; tongue slightly nicked behind; tympanum indistinct; a large inner and moderate-sized metacarpal tubercle; large shovel-shaped inner metatarsal tubercle; no outer tubercle present; subarticular tubercles prominent; toes slightly webbed and heavily fringed, in the adpressed limb the tibio-tarsal joint reaches the tympanum.

The skin is smooth with numerous small warts; a cluster of tubercles below the vent; undersurfaces smooth; a cluster of small tubercles at the jaw.

In life, the ground color is purplish-gray with numerous dark spots and reticulations; a dark streak extending through the nostril and eye to the forelimb; a dark band between the eyes and a large squarish spot below the eye; undersurfaces whitish, with the sides of the throat grayish.

The largest specimen measures 39 mm. in length.

All of the Coomooboolaroo frogs were taken at the water's edge of a shallow, muddy lagoon. The Kolonga specimen (No. 78501) has the third finger of each hand greatly flattened and the bone protruding from the tip. Boulenger³ states in a footnote that a female had on the breast two cicatrices evidently caused by the thumbs of the male. The thumbs in the Kolonga specimen, however, show no signs of a swelling or presence of protruding bone, this, as stated above, takes place in the third finger.

Limnodynastes peronii peronii (Duméril and Bibron)

(Figure 9)

The series at hand comprises 32 specimens from New South Wales, 15 (C.A.S. Nos. 82065-82076 and 77986-77988) from the Hampton-Lithgow area, 5 (C.A.S. Nos. 77981-77985) from Cox's River in the Blue Mountains, and 12 (C.A.S. Nos. 82054-82064 and 82391) from Ulong.

Vomerine teeth in two straight series behind and extending beyond choanae; tongue rounded in back; tympanum hidden; two well-developed metacarpal tubercles; a small to medium metatarsal tubercle; subarticular tubercles present, except on first finger; adult females with two inner fingers flattened and distinctly fringed; adult males with a sharply pointed metacarpal bone protruding from a longitudinal slit on top of the first finger; toes with only a trace of web. This is shown very distinctly in 12

3. Catalogue of Batrachia Salientia, p. 262.

males of the series. In the adpressed limb the tibio-tarsal joint reaches the eye, or between the eye and the nostril, but in none of the specimens does it reach beyond the nostril.

Skin smooth; a distinct fold from the back of the eye to the forelimb; lateral folds present; back of thighs granular; belly and throat smooth.

In life, the color is dark to light gray with a heavy dorsal black line, divided by a narrow white one, from between the eyes to the vent. Prominent lateral black lines are present. The dorsal line is occasionally broken, which happens in two of the Blue Mountain frogs and in one from Ulong. In general, the Blue Mountain frogs are a much darker shade than those from Ulong, which are light gray, and the white line is often obsolete.

Undersurfaces whitish, with throat, sides of belly, and undersurface of hind limbs spotted with gray.

As these frogs have considerable variation as to striping, and having



Fig. 9. *Limnodynastes peronii peronii* C.A.S. No. 77983, Cox's River, New South Wales. Natural size.

prominent, obsolete, or broken stripes, and vary in shade as well, Parker⁴ may be safely followed in considering *L. p. lineatus* a synonym.

All of these frogs were taken at night while hunting with a flashlight, the ones from Ulong being found in a small puddle with a heavy growth of grass surrounding it, and those from the Blue Mountains in a hillside spring.

Sixty mm. is the average length of an adult.

***Limnodynastes salmini* Steindachner**

(Figure 10)

This species is represented by 52 specimens, 50 (C.A.S. Nos. 82077-82126) from Callandoon and 2 (C.A.S. Nos. 82127-82128) from Bundy.

Vomerine teeth in two scarcely separated and slightly curved series behind choanae; tongue rounded behind; tympanum indistinct; a large inner metacarpal tubercle and moderate outer one; a large elongate inner metatarsal tubercle; subarticular tubercles moderate. No. 82125, a large female, has a trace of fringe on the second finger; toes with or without a bare sug-



Fig. 10. *Limnodynastes salmini* C.A.S. No. 82115, Callandoon Sheep Station, vicinity west of Goondiwindi, Queensland. Natural size.

4. *Novitates Zoologicae*, vol. 42, part 1, p. 57, April, 1940.

gestion of web; in the adpressed limb the tibio-tarsal joint reaches the tympanum.

Skin smooth; a prominent fold of skin from the back of the eye to the foreleg; a lateral fold present; region of vent slightly tubercular; undersurfaces smooth.

In life, the ground color is gray, with an elongate black patch back of the eye; a small black patch under the eye; a white or pink line from the back of the eye to the foreleg; a broken black dorsal line, with a narrow one of pink down its center; two broad lateral lines of pink, bordered by narrow, broken lines, of black; undersurfaces whitish, sides of the throat clouded with gray.

Sixty mm. from snout to vent is adult size.

The entire series from Callandoon was taken in paddocks drying out from recent rains, but with a few mudholes left. The frogs were under old logs and pieces of bark wherever there was sufficient moisture left. The two from Bundy were under the bark of a fallen tree.

***Limnodynastes tasmaniensis* Günther**

(Figure 11)

A series of 113 specimens are from the following localities: Retro, 20 (C.A.S. Nos. 77790-78009); Magenta, 2 (C.A.S. Nos. 78010-78011); Talafa, 13 (C.A.S. Nos. 78023-78034 and 77987); Coomooloolaroo, 11 (C.A.S. Nos. 78012-78022); Callandoon, 45 (C.A.S. Nos. 82148-82192); Bundy, 2 (C.A.S. Nos. 82194-82195); Keera, 1 (C.A.S. No. 82193); Blue Mountains, 19 (C.A.S. No. 82129-82147).

Vomerine teeth in two straight series behind choanae and somewhat variable in length, extending either to inner edge of the choanae, middle, or in some individuals slightly beyond outer edge; tongue slightly nicked behind; tympanum indistinct; metacarpal tubercles prominent; two metatarsal tubercles; inner slightly elongate; outer very small, occasionally indicated by a white spot; subarticular tubercles present; fingers fringed; toes lightly fringed, with indication of web; in adpressed limb tibio-tarsal joint reaches tympanum or to the back of eye.

Skin smooth, with flattened warts above; a prominent fold of skin from the back of the eye to the forelimb; anal region and back of thighs with prominent tubercles; a dermal flap covering the vent; undersurfaces smooth.

The ground color, in life, is slate or gray, with irregular spots or blotches of black; a black band extends from the nostril through the eye to the forelimb; limbs spotted or crossbarred; occasional areas of pink on the dorsal surface; a dorsal stripe of yellow, pink, or white. The throats of males are suffused with dark gray or slate.

In the present series 36 have the dorsal stripe prominent; in 49 it is obsolete, and in 28 absent.

A female from Retro measures 43 mm. in length.

In the dry sheep country such as Retro and Talafa these frogs were found at night about the watering troughs and tanks or sitting along the pipes leading from the tank to the trough. Farther south at Callandoon they were in the muddy parts of paddocks, where the surface still had some water from recent rains.

Parker⁵ is being followed in considering *L. platycephalus* and *L. olivaceus* Loveridge⁶ as synonyms.

***Lechriodus fletcheri* (Boulenger)**
(Figure 12)

This was not an uncommon frog in the virgin rain forest in the vicinity north of Ulong where 31 specimens (C.A.S. Nos. 82201-82231) were taken at an elevation of approximately 1,800 feet.

Vomerine teeth in a straight, or very slightly curved, series extending

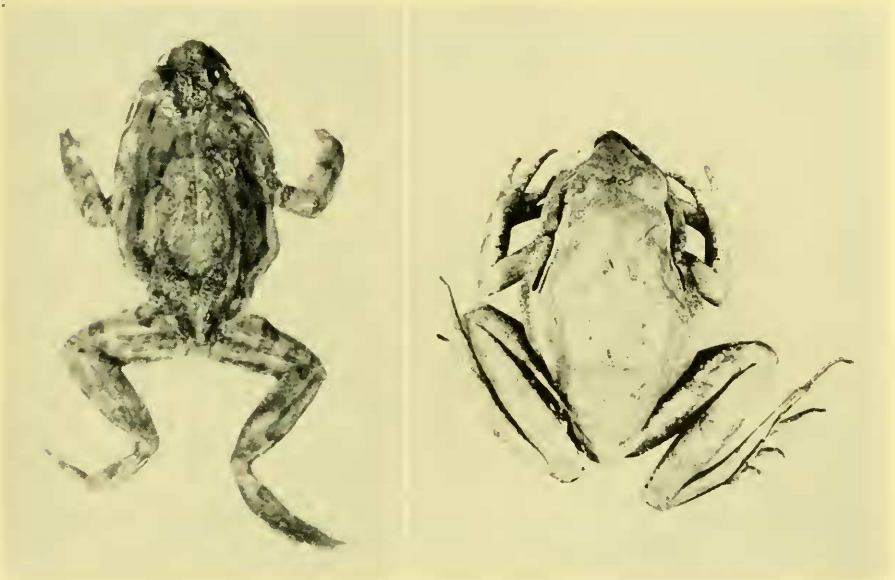


Fig. 11 (left). *Limnodynastes tasmaniensis* C.A.S. No. 77993, Retro Sheep Station, 20 miles west of Capella, Queensland. Natural size.

Fig. 12 (right). *Lechriodus fletcheri* C.A.S. No. 82201, Ulong, New South Wales. Natural size.

5. Novitates Zoologicae, vol. 42, part I, p. 52, April, 1940.

6. Bulletin of the Museum of Comparative Zoology, vol. LXXVIII, No. 1, p. 19, January, 1935.

to the outer edge of choanae; tongue slightly nicked behind; tympanum distinct and oval, with minute black tubercles scattered over surface; a large inner metacarpal tubercle and a smaller outer one; a moderately oval metatarsal tubercle; subarticular tubercles prominent; breeding females with first and second toes flattened; toes slightly webbed and heavily fringed; toes of males bordered by minute spines; in adpressed limb tibio-tarsal joint reaches snout.

The skin is smooth, but so heavily covered with minute black tubercles it has the texture of a very fine sandpaper; backs of limbs similarly covered; a prominent fold from the back of the eye to a point midway between the legs; undersurfaces smooth.

In life, this is a remarkably colored frog. There are two shades for the ground color, a light gray or a chestnut brown. A heavy black line extends from the back of the eye, sharp-edged on top and undulating below, encompasses the top of the tympanum and extends to the corner of the mouth. This is occasionally bordered above by a narrow line of pink. Tops of first and second fingers are sometimes black; backs of thighs and undersurfaces of feet are black; the limbs are crossbarred with black, the hind limbs occasionally tinted with pink; the lower surfaces are whitish, the lower jaw being edged with a very narrow black line underneath.

An average specimen of the series at hand measures 44 mm. in length and the largest 50 mm.

All of these frogs were taken in the virgin rain forest where timber was being cut. Ruts formed by the heavy tires of the logging trucks along the roads and filled with water by the night rains were their favorite haunts. On the collecting date, February 15, these frogs were breeding and the puddles contained heavy patches of gelatinous froth containing quantities of small, black eggs.

***Adelotus brevis* (Günther)**

(Figure 13)

This species, one of the most strikingly colored of the Australian amphibians, was taken in three localities, 1 (C.A.S. No. 78052) from the McPherson Range, 2 (C.A.S. Nos. 78053-78054) from Kolonga, and 123 (C.A.S. Nos. 82232-82354) from Ulong.

Vomerine teeth in two oblique series behind choanae; maxillary teeth prominent; tongue rounded behind; tympanum hidden; prominent inner metacarpal and metatarsal tubercles and less prominent outer ones; subarticular tubercles prominent; females with first two fingers flattened and fringed, with slight indication of web; toes with slight indication of web; in adpressed limb tibio-tarsal joint reaches tympanum. At the tip of the lower jaw are two tooth-like erections of skin, very prominent in males and much reduced or hardly discernible in females.

The skin is smooth with a light scattering of small warts, which are heavier and more numerous on the back of the thighs.

In life, the ground color is light or dark gray with irregular markings of black; a large black blotch on the top of the head and a curved band from the tip of the snout, passing through the eye to the corner of the mouth; limbs heavily crossbarred with black; the undersurfaces are rich pink, heavily mottled or reticulated with black. In alcohol this pink disappears rapidly, leaving a dull white color. Some individuals have the throat clouded with gray and minutely spotted with pink.

An adult measures 37 mm. in length.

The McPherson Range specimen was found in the imprint of a horse's hoof in the mud at the side of a water trough, while those from Ulong were found under logs, bark, boards, and various types of debris. A few were found in shallow rain puddles hiding at the roots of the grass and covered with a blanket of small bubbles. No signs of eggs could be found.

***Crinia signifera signifera* (Girard)**

(Figure 14)

This highly variable species was taken in three localities: 36 (C.A.S. Nos. 78066-78101) from Nangabrook; 6 (C.A.S. Nos. 82396-82401) from Callandoon; 1 (C.A.S. No. 82394) from the Blue Mountains; and 1 (C.A.S. No. 82395) from Ulong.

The majority of those from Nangabrook are not mature and it is dif-

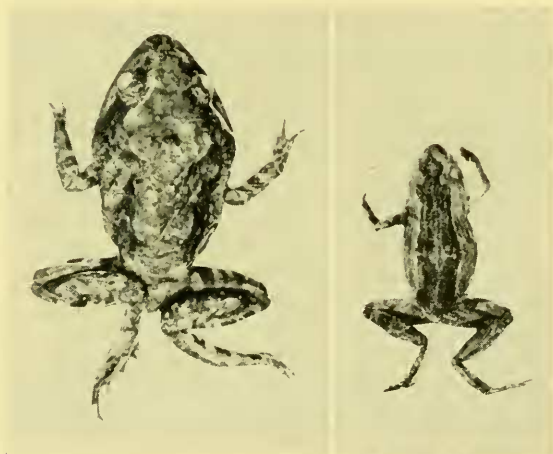


Figure 13 (left). *Adelotus brevis* C.A.S. No. 82253, Ulong, New South Wales. Natural size.

Fig. 14 (right). *Crinia signifera signifera* C.A.S. No. 82394, Blue Mountains, New South Wales. Natural size.

difficult to distinguish the characteristics of the species. However, vomerine teeth lacking in more mature individuals; tympanum hidden; a large outer and small inner metacarpal tubercle; palmar and subarticular tubercles very prominent; a small inner and outer metatarsal tubercle; back of thighs granular; belly and sides with flattened granules; dorsal surface smooth. In adpressed limb tibio-tarsal joint reaches close to back of eye.

In life, the color brown or bluish-gray, some individuals with a black lateral stripe from tip of snout to groin; back of thighs occasionally pink; a dark area on dorsal surface back of eyes and a trace of a narrow vertebral stripe; undersurface whitish, spotted, or marbled with black.

The Callandoo specimens are less tubercular and have a tendency towards a uniform grayish, with hind limbs crossbarred with black, while the one from the Blue Mountains has a broad black dorsal band.

One of the largest individuals is 24 mm. from snout to vent.

The entire series was taken under bark slabs or at the roots of grass tufts close to standing water.

***Crinia georgiana* Tschudi**

Eleven specimens (C.A.S. Nos. 78055-78065) were taken at Nangabrook.

Not one of those at hand shows any signs of vomerine teeth; tympanum barely visible; a large outer and small inner metacarpal tubercle; a small inner and outer metatarsal tubercle; palmar and subarticular tubercles prominent; in adpressed limb tibio-tarsal joint reaches to back of tympanum.

The dorsal surface is smooth; belly and sides heavily tuberculated; throat with more flattened tubercles.

The largest specimen in the series measures 32 mm. from snout to vent.

In life, ground color brownish with black areas over dorsal surface; a black lateral stripe from tip of snout to groin, which has a rich reddish to pink area; back of thighs similarly colored; undersurface whitish, sprinkled with black; a dark area in the middle of throat.

This series was taken about the roots of grass tufts close to standing water.

***Uperolia marmorata* Gray**

(Figure 15)

Only two specimens of this species were taken, 1 (C.A.S. No. 82402) at Noondoo, and 1 (C.A.S. No. 82403) from the Blue Mountains.

Vomerine teeth absent; tongue rounded behind, tympanum hidden; a large parotoid gland present; an inner and outer metacarpal tubercle; a prominent elongate metatarsal tubercle and a rounded outer one; subarticular tubercles prominent. The two specimens mentioned show no indication of webbing but have the fingers and toes rounded. In the adpressed limb the tibio-tarsal joint reaches the back of the eye.

Skin smooth with longitudinal rows of small tubereles; undersurface of thighs and the anal region covered with small tubereles.

In life, the color is olive-brown with a white groin patch; back of thighs whitish; undersurfaces yellowish, the throat and belly are clouded with gray and minutely spotted with black.

The larger specimen is from the Blue Mountains and measures 28 mm. from snout to vent.

Both were taken under stones.

***Uperolia rugosa* (Anderson)**
(Figure 16)

This was found to be an abundant species in southern Queensland and was also found in northern New South Wales. It was taken at the following localities: 3 (C.A.S. Nos. 78102-78104) Coomooboolaroo; 182 (C.A.S. Nos. 82404-82584 and 83233) Noondoo; 83 (82585-82667) Callandoon; 5 (C.A.S. Nos. 82668-82672) Keera; 3 (C.A.S. Nos. 82673-82675) Bundy.

Vomerine teeth greatly reduced and barely perceptible in some individuals; tongue oval and free behind; tympanum hidden; an inner and outer metacarpal tuberele; two prominent metatarsal tubereles, the inner compressed and the outer rounded; subarticular tubereles prominent; toes with an indication of fringe; in adpressed limb tibio-tarsal joint reaches to back of eye; a prominent parotoid gland.

The dorsal surface and the back of the thighs are covered with minute tubereles. These are scattered and not in longitudinal rows as in *U. marmorata*. The belly is smooth and the sides of the body finely granular.



Fig. 15 (left). *Uperolia marmorata* C.A.S. No. 82403, Blue Mountains, New South Wales. Natural size.

Fig. 16 (right). *Uperolia rugosa* C.A.S. No. 83233, Noondoo, Queensland. Natural size.

Color in life, silvery gray, groin and back of thigh with large, rich orange blotch; undersurfaces whitish, shaded with dark gray; throat very dark gray to blackish. Preserved specimens present a very different color pattern. It is not until they are in alcohol that the brown to blackish markings covering the dorsal surface appear and the orange changes to white. The average adult measures 25 mm. from snout to vent.

This species was found under any type of cover, but mostly under old bark, stones, or logs. At Noondoo, where it was abundant, it was not uncommon on turning over a log to find as many as six or seven individuals huddled together in remarkably dry, sandy soil.

***Pseudophryne bibronii* Günther**

(Figure 17)

This little toad was not met with in numbers, though it is said not to be uncommon and is widely spread through southeastern Australia. In the Blue Mountains 4 (C.A.S. Nos. 82676–82679) were taken in the Hampton-Lithgow area; 3 (C.A.S. Nos. 78112–78114) on the banks of Cox's River; and 1 (C.A.S. No. 83239) at Bowenfalls. Six (C.A.S. Nos. 78105–78110) are from Coomoboolaroo and 1 (C.A.S. No. 78111) is from Kolonga.

Vomerine teeth and tympanum absent; tongue oval and free behind; a large outer and medium-sized inner metacarpal tubercle; a large inner and medium-sized outer metatarsal tubercle; subarticular tubercles prominent; second and third toes with a slight indication of fringe; tip of fourth toe reaches the snout.

Dorsal surface covered with minute tubercles; back of thighs granular; belly smooth.



Fig. 17 (left). *Pseudophryne bibronii* C.A.S. No. 82678, Blue Mountains, New South Wales. Natural size.

Fig. 18 (right). *Pseudophryne coriacea* C.A.S. No. 82680, Ulong, New South Wales. Natural size.

From my notebook I copy the following description of the specimens taken at Coomooboolaroo. Dorsal surface cinnamon with black reticulations; a canary-yellow patch in back of the forearm; a transverse canary-yellow line above the vent; undersurfaces marbled with black and white. In preserved specimens the yellow turns to white and the cinnamon loses its brightness and becomes a dull brown.

An average individual measures 26 mm. from snout to vent.

Five of the specimens from Coomooboolaroo were taken under a stone in a drying-up creek bed and one under an old piece of wood alongside a water trough.

***Pseudophryne coriacea* Keferstein**

(Figure 18)

A single specimen of this species (C.A.S. No. 82680) was taken under an old log in the rain forest at Ulong.

Vomerine teeth and tympanum absent; tongue oval and free behind; a large outer metacarpal tubercle and a mere indication of an inner one; moderate inner metatarsal tubercle and a minute outer one; subarticular tubercles prominent. With limb adpressed, tip of the longest toe reaches beyond snout.

The dorsal surface is covered with minute tubercles and the sides and back of the thighs are granular.

In life, the dorsal color of this specimen was a dark orange; sides and belly black; undersurface of belly and limbs with irregular white markings.

It measures 25 mm. from snout to vent.

***Notaden bennetti* Günther**

(Figure 19)

Nine specimens of this little toad were taken as follows: 2 (C.A.S. Nos. 82681-82682) from Noondoo; 6 (C.A.S. Nos. 82683-82688) from Callandoon, and 1 (C.A.S. No. 82689) from Bundy.

This is an easily distinguished form, the body being short and stout, almost globular in shape. Mouth very small, legs and toes short, the latter very much flattened and heavily fringed; a large outer metacarpal tubercle and a smaller inner one; a large elongate metatarsal tubercle present; a tubercle at the base of each finger; tympanum hidden.

The skin is somewhat leathery in texture. In life, the ground color is a light pea-green, covered with black warts forming a cross-like pattern on the back, these sometimes being crowned with an orange-colored spot; a number of small, white warts, on the sides and anal region; back of thighs covered with small tubercles. The undersurface is whitish, the throat being covered with black spots.

A specimen from Noondoo (No. 82681) measures 40 mm. from snout to vent.

These toads are reported to be sometimes seen in countless numbers after a rain, but despite the fact that a rain did fall at Callandoon, where the largest series were taken, there were no signs of them while hunting with a light after dark. Those secured were chopped out of a small log half buried in the earth. The Noondoo specimens were found under logs in quite sandy soil.

On account of the cross-like pattern on the back I have heard these toads referred to as the "Holy Cross Toad" and "Catholic Frog."

Hyla adelaidensis Gray

(Figure 20)

This species was met with in only one locality, Nangabrook, West Australia, where 61 specimens (C.A.S. Nos. 78446-78506) were taken.

A slenderly built frog with a decidedly acuminate snout; vomerine teeth in two rounded clusters between choanae; tongue oval, with free edges and nicked behind; tympanum prominent, about two-thirds diameter of the eye; subarticular tubercles prominent; a sharp inner metatarsal tubercle; fingers lightly webbed and toes fully webbed; in adpressed limb tibio-tarsal joint reaches snout.

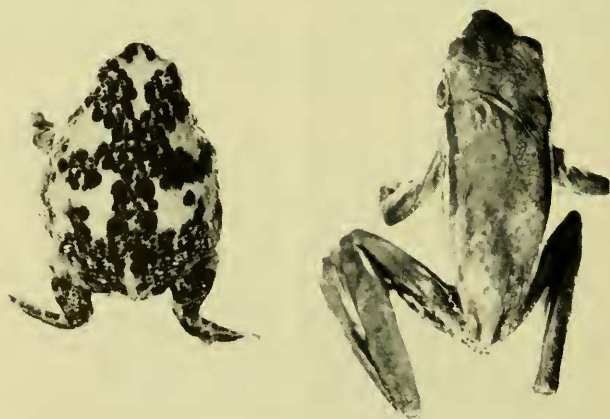


Fig. 19 (left). *Notaden bennetti* C.A.S. No. 82689, Bundy Sheep Station, 20 miles southeast of Moree, New South Wales. Natural size.

Fig. 20 (right). *Hyla adelaidensis* C.A.S. No. 78454, Nangabrook, West Australia. Natural size.

Skin smooth above, granular on belly and undersurface of thighs; a prominent dermal fold across chest.

This is a brilliantly marked species, if not the most colorful met with. In life, dorsal region greenish gold; a black area from the back of the eye to the shoulder, bordered below by a thin line of yellow, which extends along side to a point midway between limbs; back of thighs black, heavily spotted with yellow; undersurfaces yellow, throat clouded with gray. Forty mm. is average size for an adult.

All of this series were taken in the still waters of a slow-moving stream flowing through the heart of the giant gum forest in the vicinity of Nangabrook.

Hyla aurea (Lesson)
(Figure 21)

Though not an uncommon Australian frog this species was met with only once, at Nangabrook, West Australia, where three specimens (C.A.S. Nos. 78507-78509) were taken.



Fig. 21. *Hyla aurea* C.A.S. No. 78508, Nangabrook, West Australia. Natural size.

Vomerine teeth between choanae in two, slightly oblique, transverse series; tongue oval with free lateral edges and nicked behind; tympanum prominent; two thirds the diameter of eye; subarticular tubercles prominent on fingers, less so on toes; a moderate, wedge-shaped, metatarsal tubercle; fingers with rudimentary webs; toes fully webbed. In adpressed limb tibio-tarsal joint reaches to front of eye.

The skin is smooth. A very prominent fold from the back of the eye over the tympanum to the base of the forearm is present. The sides, belly, throat, and the undersurface of the thighs are strongly tubercular in the more mature specimens.

In life, the three Nangabrook specimens did not show the gaudy colors accredited to this species, the ground color being gray with a tinge of green. A broad dorsal line of light gray and two lateral lines of similar color are present. The area between these lines is dark gray, broken up into large elongate spots on the sides.

The undersurfaces are whitish, with traces of dark gray reticulations. The largest specimen in the series measures 67 mm. and is probably half grown.

Two specimens were found in still water ponds alongside a stream and one was dug out of a hole in the bank of a stream.

***Hyla aurea ulongae* Loveridge⁷**

A single male (C.A.S. No. 83235, Australian Museum Register No. R-13817) was taken at Ulong, New South Wales. Not conforming with the specimens at hand and so as not to add to synonymy it was sent to Mr. Arthur Loveridge, at Harvard College, Cambridge, Mass., who had worked over the extensive Australian collection at that institution and who determined it to be a new subspecies, being characterized by a single series of vomerine teeth between the choanae.

***Hyla bicolor* (Gray)**

(Figure 22)

This little hyla, of which 110 specimens were taken, was found in only two localities, Kolonga Creek and Ulong. From the former locality 37 (C.A.S. Nos. 78254-78290) were taken and 73 (C.A.S. Nos. 82690-82762) are from the latter.

Vomerine teeth absent; tongue more or less oval and nicked behind; tympanum distinct, two-thirds diameter of eye; subarticular tubercles mod-

7. Loveridge, A. New frogs of the genera *Cyclorana* and *Hyla* from southeastern Australia. Proceedings of the Biological Society of Washington, vol. 63, pp. 131-138. 1950.

erate, finger rounded with trace of web at base; toes two-thirds webbed; in the adpressed limb tibio-tarsal joint reaches to tip of snout.

Skin smooth, with a prominent dermal fold across chest; belly and undersurface of the thighs strongly granular, throat slightly so to smooth.

In life, the color is pea-green with a narrow white line extending from a point under the eye to the forelimb; tympanie area blackish; undersurfaces whitish. In two individuals in the present series the white line extends beyond the forelimb to a point midway between the limbs.

An individual 25 mm. in length from Ulong is the largest of the series.

At Ulong these little frogs were taken while sitting on the leaves and stems of wild blackberry bushes in open meadows, and at Kolonga Creek among vines and potted plants about the homestead.

Hyla caerulea (Shaw)

This species is represented by 122 specimens from Queensland and 11 from New South Wales as follows: from Queensland, 19 (C.A.S. Nos. 78116-78134) Coomoooolaroo; 25 (C.A.S. Nos. 78135-78159) Talafa; 3 (C.A.S. Nos. 78160-78162) Magenta; 48 (C.A.S. Nos. 78163-78210) Retro; 17 (C. A.S. Nos. 78211-78227) Kolonga Creek, and 10 (C.A.S. Nos. 83162-83170 and 83226) from Noondoo. From New South Wales, 9 (C.A.S. Nos. 83173-83179 and 83227-83228) Bundy, and 2 (C.A.S. Nos. 83171-73172) from Ulong.

Vomerine teeth in two dome-shaped clusters between and on a level with posterior edge of choanae; tongue round, with free edges, and very slightly nicked behind; tympanum distinct, slightly smaller than diameter of the



Fig. 22 (left). *Hyla bicolor* C.A.S. No. 82740, Ulong, New South Wales. Natural size.

Fig. 23 (right). *Hyla ewingii alpina* C.A.S. No. 83187, Blue Mountains, New South Wales. Natural size.

eye; a moderate-sized outer metatarsal tubercle; subarticular tubercles prominent; fingers and toes heavily fringed; fingers one-third webbed; toes two-thirds webbed; tibio-tarsal joint in adpressed limb reaches eye; disks on fingers and toes very large, width of largest toe disk equaling the diameter of eye, 6 mm. in an individual 83 mm. in length.

The skin is smooth, with the top of the head covered by minute pits. The throat, belly, and undersurfaces of the thighs are strongly granular.

In life, the usual color of adults is a uniform light pea-green, though occasionally a few minute spots of white may occur on the dorsal and lateral regions. The undersurfaces are whitish to light-straw color.

Juveniles may have a few white markings. Two individuals from Bundy, each 36 mm. in length and one from Noondoo, 38 mm. in length, are marked as follows: No. 83227 (Bundy) has a few dorsal and lateral white spots; thighs very sparsely spotted; white patch on forearm; white line from forearm along upper jaw to a point under middle of eye; a white line along back of forearm.

No. 83228 (Bundy) has a minute spot on the forearm, is sparsely spotted on the sides, and has a short white line along the upper jaw extending to a point under the middle of the tympanum.

No. 83226 (Noondoo) has two or three lateral spots; a white line along the back of the forearm; a small spot on the upper forearm; a short line in back of the tympanum on the left side and under the tympanum on the right side.

These frogs were usually found about habitations, where they hide under water tanks, watering troughs, etc., wherever there is a vestige of moisture. The entire series of 17 specimens from Kolonga Creek were taken out of a fireplace in the living room of the station house. Not being in use during the summer the blower was put on tightly and the frogs, bunched up on the brick floor, had an undisturbed hideout. Another favorite spot was under the water tanks about the pastures. The frogs hid out in the daytime under the tanks and around the edges, obtaining sufficient moisture from overflow and leaks which kept the grass damp and green. At night the entire population of a tank would emerge and would sit along the water pipes leading to the troughs, so that just about two visits would be sufficient to capture the entire population of a tank.

The remains of a weevil were found in one of the juvenile specimens from Bundy.

***Hyla ewingii alpina* Fry**
(Figure 23)

Only two specimens of this frog were taken, C.A.S. No. 83186 from Ulong, and C.A.S. No. 83187 from the Hampton-Lithgow area in the Blue

Mountains. This is a larger frog than *H. e. verauxii* and has the dorsal surface covered with minute tubereles.

The color pattern is decidedly different, being grayish with an irregular-edged dorsal band of brown and a large diagonal brown blotch near the groin. The undersurfaces are whitish with grayish throats. Both are males with large vocal pouches.

Both measure 34 mm. from snout to vent.

***Hyla ewingii verauxii* Dumèril**

Eight examples of this tree frog were taken as follows: 2 (C.A.S. Nos. 78444-78445 from the Cox River, Blue Mountains; 3 (C.A.S. Nos. 83183-83185) Hampton-Lithgow area, Blue Mountains; and 3 (C.A.S. Nos. 83180-83182) are from Ulong.

Vomerine teeth either in two rounded clusters or two elongate series between choanae; tongue oval and nicked behind; tympanum distinct; metacarpal tubereles moderately prominent; a small oval inner metatarsal tuberele; toes three-fourths webbed, except the inner which is without web; fingers with rudimentary webs. In the adpressed limb the tibio-tarsal joint reaches the eye.

The skin is smooth on the dorsal surface and the undersurface of the belly. Throat and thighs are granular.

In life, the color is grayish, with broad lateral stripes of brown. A broad black band extends from the tip of the snout, passes through the eye and over the tympanum, to the forelimb. This is sometimes bordered below with a narrow white line. The flanks are marked with large oval or squarish spots. The undersurfaces are whitish, the throat sometimes clouded with dark gray.

The spotting of the flanks seems to vary somewhat, the frogs from the Blue Mountains being heavily marked, while those from Ulong have few and very small spots.

***Hyla kinghorni* Loveridge⁸**

One example (C.A.S. No. 83234, Australian Museum Register No. R-13818) is from Ulong, New South Wales. Being in the same category as a preceding species (*Hyla aurea ulongae*) it also was sent to Mr. Arthur Loveridge who determined it as new, being closely related to *Hyla palmata*. It was named after the well-known herpetologist, Mr. J. R. Kinghorn, of the Australian Museum.

8. Loveridge, A. New frogs of the genera *Cyclorana* and *Hyla* from southeastern Australia. Proceedings of the Biological Society of Washington, vol. 63, pp. 131-138. 1950.

***Hyla latopalmata* (Günther)**

(Figure 24)

This name is applied to 69 specimens as follows: 45 (C.A.S. Nos. 78539–78577) Kolonga Creek; 7 (C.A.S. Nos. 78532–78538) Talafa; 6 (C.A.S. Nos. 78526–78531) Coomooboolaroo, and 11 (C.A.S. Nos. 83151–83161) are from Callandoon.

These frogs are similar in size and do not appear to differ from *H. lesueurii* in any way except coloration, and this is not absolutely constant. The length of the hind limb varies as it does in *H. lesueurii* and cannot be used as a character. The frogs called *H. latopalmata* have the dorsal surface clouded or marbled with a darker gray than the ground color in 47 out of 69 cases.

Though *H. latopalmata* has been recognized as distinct from *H. lesueurii* the distinguishing characters given do not seem to warrant it. The chief difference given seems to be that the former species is more slender in habit, but in comparing a series of both species that are equal in size this character is not substantiated. As past writers have been somewhat dubious as to its status it may eventually become a synonym of *H. lesueurii*, or at least a subspecies.

***Hyla lesueurii* Dumèril and Bibron**

(Figure 25)

One hundred and ten specimens of this hyla were taken; 16 (C.A.S.



Fig. 24 (left). *Hyla latopalmata* C.A.S. No. 78549, Kolonga Creek Cattle Station, 25 miles north of GinGin, Queensland. Natural size.

Fig. 25 (right). *Hyla lesueurii* C.A.S. No. 78523, Coomooboolaroo Cattle Station, 15 miles south of Daringa, Queensland. Natural size.

Nos. 78510-78525) from Coomooboolaroo, 29 (C.A.S. Nos. 83058-83080) from Ulong, and 65 (C.A.S. Nos. 83087-83151) from Hampton-Lithgow area.

Vomerine teeth in two elongate series between the choanae, occasionally joining on median line; tongue rounded and nicked behind; tympanum distinct; two-thirds diameter of the eye; subarticular tubercles prominent; a small, oval, inner metatarsal tubercle; outer metatarsal tubercle minute or absent. Out of 23 examples the outer metatarsal tubercle is absent in six; represented by a mere dot in twelve and distinct in five. Fingers without webs, and toes two-thirds webbed. In the adpressed limb the tibio-tarsal joint reaches to a point between the eye and the snout in one, to the snout in twelve, and beyond the snout in ten. In the *vinosa* variety four reach the snout and two slightly beyond.

A fold of skin passes over the tympanum, curving downward to the forearm. The skin is smooth above, the belly and undersurface of the thighs being granular.

The largest specimen in the Ulong series measures 42 mm. from snout to vent and six specimens of the *vinosa* variety 66, 64, 63, 62, 61, 61, respectively.

In life, the ground color was both grayish and buff. Shown under a light at night the buff color was extremely light, but in daylight changed to a much darker shade. A heavy black band starts at the tip of the snout, passes through the eye and over the tympanum to the forearm. There is considerable black marbling in the groin and the back of the thighs. The undersurfaces are whitish, with the throat sparsely clouded with gray. In the *vinosa* variety there are large, white-spotted, black blotches in the groin and the back of the thighs are black with whitish rings, usually with a white spot in the center.

In the daytime these frogs were found under boards and rocks and at night sitting on stones in the bed of a running stream.

Hyla nasuta (Gray)

(Figure 26)

Kolonga Creek was the only locality where this species was found. Fifty-six specimens (C.A.S. Nos. 78578-78605 and 78607-78634) were taken.

Hyla nasuta is a slenderly built frog with nose strongly acuminate and long hind legs.

The vomerine teeth are in two rounded clusters between the choanae. In a single specimen, No. 78579, they show a tendency to be elongated and in an oblique position. Tongue oval, with free edges, and nicked behind; tympanum prominent, about equal to diameter of eye; an elongate inner metatarsal tubercle; a small rounded outer metatarsal tubercle; fingers free

of web; toes two-thirds webbed; in adpressed limb tibio-tarsal joint reaches well beyond snout.

Skin smooth, with more or less obsolete longitudinal folds; undersurface of thighs and belly lightly granular; throat smooth; a prominent fold across chest.

In life, the ground color is grayish or brownish with three rows of black, elongate, oval spots down the back; two thin light dorsal stripes separate the middle from the lateral spots; loreal region black; a black line, bordered above and below by a narrower white one on the back of the thighs; undersurfaces whitish. The males have the throats suffused with dark gray.

The entire series were taken in Kolonga Creek, a wide, shallow, and slow-moving stream, running through the station property. The frogs were found floating amongst the patches of grass close to the bank. The average length of an adult in the present series is 46 mm.

Hyla parvidens Peters

This name has been applied, with some hesitancy, to two immature specimens (C.A.S. Nos. 78442-78443) taken on the banks of the Cox River, New South Wales. Neither one shows the adult type of coloration, but some of the characteristics of the species are present; the clear coloring of the back of the thighs, the small tympanum, and the more or less obsolete vomerine teeth. In the adpressed limb the tibio-tarsal joint reaches to the



Fig. 26. *Hyla nasuta* C.A.S. No. 78604, Kolonga Creek Cattle Station, 25 miles north of GinGin, Queensland. Natural size.

eye. The larger one measures 22 mm. from snout to vent and is a slight reddish-brown, with darker marbling or spotting on the dorsal surface. The undersurfaces are whitish. The belly and anal region are tubercular.

Hyla peronii (Tschudi)
(Figure 27)

Fifty-three specimens of this strikingly marked hyla were taken, 18 (C.A.S. Nos. 78228-78245) Coomoooolaroo; 3 (C.A.S. Nos. 78246-78248) Talafa; 5 (C.A.S. Nos. 78249-78253) Kolonga Creek; 18 (C.A.S. Nos. 83206-83220 and 83231-83232) Noondoo; 1 (C.A.S. No. 83221) Callandoon; 3 (C.A.S. Nos. 83237-83238) from Ulong; and 5 (C.A.S. Nos. 83222-83225 and 83229) from Bundy.

Vomerine teeth in two transverse series between the choanae; tongue rounded, with free edges and slightly nicked behind; tympanum distinct, about two-thirds diameter of eye; a small outer metatarsal tubercle; sub-articular tubercles prominent; fingers and toes heavily fringed; fingers two-thirds webbed and toes fully webbed; disks on fingers and toes large, the largest equaling diameter of tympanum; in adpressed limb the tibio-tarsal joint reaches to back of eye.

The skin is somewhat rugose. A prominent fold extends from the back of the eye and over the tympanum to the forearm and a pronounced dermal fold across the chest is present. The throat, belly, and the undersurface of the thighs are strongly tubercular.



Fig. 27. *Hyla peronii* C.A.S. No. 78246, Talafa Sheep Station, 20 miles south of Emerald, Queensland. Natural size.

This species is a strikingly marked frog. In life, the color is dark gray to slate, the dorsal surfaces being clouded or marbled with black. The area back of the forearm, the sides, groin, and back of the thighs are marbled or spotted with black and a rich canary-yellow, the latter color completely disappearing in alcoholic specimens. A light gray, and somewhat obsolete dorsal stripe may be present. The undersurfaces are whitish to straw color.

The largest specimen taken is from Ulong and measures 65 mm. from snout to vent. This one, however, is apparently a large specimen, the average length in the series being around 43 mm.

At Coomooboolaroo these frogs were found under the bark of standing trees and at Ulong clinging to reeds in small ponds along the edge of a creek running through an open meadow. The series from the Hampton-Lithgow area were all found under small stones in the dry portions of a river bed.

***Hyla rubella* Gray**

(Figure 28)

This was by far the most abundant hyla met with, 447 being taken as follows: 138 (C.A.S. Nos. 78291-78428) Coomooboolaroo; 5 (C.A.S. Nos. 78429-78433) Talafa; 6 (C.A.S. Nos. 78434-78439) Kolonga Creek; 2 (C.A.S. Nos. 78440-78441) Retro; 153 (C.A.S. Nos. 83230, 82780-82916 and 83042-83057) Noondoo; 7 (C.A.S. Nos. 82917-82923) Callandoo; 136 (C.A.S. Nos. 83188-83205 and 82924-83041) Bundy.

Vomerine teeth in two small clusters between and behind choanae; tongue oval with free edges; tympanum distinct, about two-thirds diameter of eye; subarticular tubercles prominent; a small, elongate inner meta-



Fig. 28. *Hyla rubella* C.A.S. No. 78432, Talafa Sheep Station, 20 miles south of Emerald, Queensland. Natural size.

tarsal tubercle; fingers free of web and toes two-thirds webbed. Loveridge⁹ states that specimens preserved in formalin show the fifth toe fully webbed to the base of the disk, but that this condition is not found in alcoholics. The present series is preserved in alcohol and this character is occasionally met with. The disks on the fingers and toes vary considerably in size. In the adpressed limb the tibio-tarsal joint reaches the back of the tympanum.

The skin is smooth above with the sides, throat, belly, and undersurface of thighs, granular. A prominent dermal fold crosses the chest.

In life, the ground color is light or dark cinnamon covered with minute spots of black. A prominent blackish band extends from the tip of snout, through eye, to back of shoulder and occasionally to groin; undersurfaces whitish or yellowish; throat of males suffused with black. Adults average 35 mm. in length.

These hylas sought almost any type of cover and were found in water troughs, holes in fence posts, and under debris and bark of fallen or standing trees. As many as a dozen, or even 20 were found huddled together under a single slab of bark.

Under a light at night the skin is a rich reddish-pink.

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